

New Descriptions

A NEW FAMILY OF MASTACEMBELOID FISH FROM INDIA¹

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The genus *Pillaia* was erected by Yazdani (1972) for a remarkable eel-like fish, *P. indica* Yazdani, from the Khasi Hills (Meghalaya), India. The genus exhibited such a combination of characters that it could be placed in the suborder Mastacemboidei without assigning it to any known family. Berg (1940) recognised two separate orders Mastacembeliformes and Chaudhuriiformes for the families Mastacembelidae and Chaudhuriidae, respectively. Greenwood *et al.* (1966), on the basis of phylogenetic relationship, grouped these two families under the suborder Mastacemboidei of the order Perciformes. Mastacembelidae occurs both in Oriental and Ethiopian regions whereas Chaudhuriidae, known by a single species, *Chaudhuria caudata* Annandale, 1918, is so far restricted to Oriental region in the Inlé Lake, Burma, which is about 350 miles (560 km) from the area of occurrence of *Pillaia indica*.

The morphology and anatomy of *P. indica* has been studied by dissecting specimens as well as by examining alizarin preparations. For comparison, alizarin preparations of *Mastacembelus armatus* Lacépède and type specimen of *Chaudhuria caudata* which is the only material

of this species available at the Zoological Survey of India, Calcutta, have also been examined. Characters of taxonomic value of *Pillaia*, Mastacembelidae and Chaudhuriidae have been compared in Table in order to show the relationship between them as well as to justify erection of a new family. All the available information on the morphology, osteology and anatomy of Mastacembelidae (*see* Berg 1940; Sufi 1956) and of Chaudhuriidae (*see* Annandale 1918; Annandale & Hora 1923; Mitra & Ghosh 1931; Berg 1940) have also been used for comparison.

The comparison given in Table justify placement of the genus *Pillaia* under the suborder Mastacemboidei. However, certain emendments in the definition of the suborder become necessary after inclusion of *Pillaia*. They are: presence or absence of free maxilla and presence of small to large and weak to strong premaxilla. *Pillaia* shares characters of both Mastacembelidae and Chaudhuriidae in such a combination (*see* Table) that it is not possible to accommodate it in any one of these families. Therefore, a new family, Pillaiidae, is proposed. It can be distinguished from the other two families by the following key characters:

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- A. Free spines present before dorsal and anal fins; scales present. absent.
 Caudal united with or narrowly separated from dorsal and anal, having 15 or more branched rays; branchiostegals 6; a well-developed fleshy rostral appendage present
 Mastacembelidae 1. Caudal united with dorsal and anal, having 8-10 unbranched rays; branchiostegals 6; a very indistinct fleshy rostral process present Pillaiidae
 2. Caudal separated from dorsal and anal, having 7 unbranched rays; branchiostegals 5; fleshy rostral appendage absent.... Chaudhuriidae
- B. No spines before dorsal and anal fins; scales

TABLE

COMPARISON OF CHARACTERS OF *Pillaia*, MASTACEMBELIDAE AND CHAUDHURIIDAE

<i>Pillaia</i>	MASTACEMBELIDAE	CHAUDHURIIDAE
1. Body eel-like, sub-cylindrical and elongated.	Body eel-like, compressed and elongated.	Body eel-like, compressed and elongated.
2. Head depressed anteriorly.	Head not depressed anteriorly.	Head not depressed anteriorly.
3. Snout short with a very indistinct fleshy rostral appendage.	Snout elongated with a well-developed fleshy rostral appendage.	Snout short without any trace of fleshy rostral appendage.
4. Mouth non-protractile.	Mouth non-protractile.	Mouth non-protractile.
5. Upper jaw consists of a single large, strong hockey-stick shaped bone bearing teeth. It corresponds to premaxilla of perciform fishes.	Upper jaw consists of two bones viz. premaxilla bearing teeth and maxilla toothless as is found in all perciform fishes.	Presence of separate maxilla not known. However, the tooth bearing bone in <i>Chaudhuria caudata</i> which Annandale (1918) called as maxillary should correspond strictly to the premaxilla of perciform fishes.
6. Branchiostegal rays 6.	Branchiostegal rays 6.	Branchiostegal rays 5.
7. No scales on body.	Minute scales present on body.	No scales on body.
8. No spines before long dorsal and anal fins.	Spines present before long dorsal and anal fins.	No spines before long dorsal and anal fins.
9. Preopercular with one spine.	Preopercular with or without spines.	No information available.
10. Pelvic girdle and fin absent.	Pelvic girdle and fin absent.	Pelvic girdle and fin absent.
11. Pectoral fin with 7-9 rays.	Pectoral fin with 17-27 rays.	Pectoral fin with 6 rays.
12. Pectoral girdle (Supracleithrum) attached to the vertebral column.	Pectoral girdle (Supracleithrum) attached to the vertebral column.	Pectoral girdle (Supracleithrum) attached to the vertebral column.
13. Cleithrum present.	Cleithrum present.	Cleithrum completely fused with supracleithrum.
14. Post-temporal absent.	Post-temporal (except its lateral line component) absent.	Post-temporal absent.

<i>Pillaia</i>	MASTACEMBELIDAE	CHAUDHURIIDAE
15. Pectoral radials absent.	Pectoral radials present.	Pectoral radials absent.
16. Caudal fin homocercal, short confluent with dorsal and anal.	Caudal fin homocercal, short, either confluent with dorsal and anal or narrowly separated.	Caudal fin homocercal, fairly long, separated from dorsal and anal.
17. Two large hypurals united at their bases, fused with last centrum, bearing 8-10 unbranched rays.	Five to seven hypurals bearing 15 or more branched rays.	Two large hypurals united at their bases, firmly attached to the last centrum, bearing 7 unbranched rays.
18. Skull elongated gradually narrowing forwards.	Skull much elongated gradually narrowing forwards.	Skull elongated, gradually narrowing forwards.
19. Fairly large nasals, separated fully in the middle by a spindle-shaped ethmoid.	Large nasals, separated in the middle by the narrow upper edge of the ethmoid.	Very large expanded nasals, not separated in the middle by the ethmoid.
20. Infraorbital (pre-orbital) bone large articulating with lateral ethmoid.	Infraorbital (preorbital) bone large, articulating with lateral ethmoid.	No information available.
21. Lateral ethmoid small.	Lateral ethmoid small.	Lateral ethmoid small.
22. Frontals large.	Frontals large.	Frontals large.
23. Parietals separated by supraoccipital.	Parietals separated by supraoccipital.	Parietals separated by supraoccipital.
24. Vomer toothless.	Vomer toothless.	No information available.
25. Palatines narrow flakes of bone movably united to parasphenoid and vomer.	Palatines narrow flakes of bone immovably united to ethmoid, vomer and parasphenoid.	Palatines much larger, joined to the pterosphenoid (alisphenoid) by a long suture.
26. Pterygoid movably united to lateral ethmoid outside the palatine.	Pterygoid movably united to lateral ethmoid outside the palatine.	No information available.
27. Vertebrae 62; 26 precaudal and 36 caudal (counted in two specimens).	Vertebrae 85-96; 37-39 precaudal and 47-48 caudal.	Vertebrae 70 (<i>see</i> Annandale 1918).
28. Stomach and intestine with U-shaped bends.	Stomach and intestine with U-shaped bends.	Alimentary canal almost straight.
29. No pyloric caeca.	Two pyloric caeca present.	No pyloric caeca.
30. Largest mature specimen measured 77 mm in total length.	Largest specimens measured 190 to 750 mm in total length.	Largest mature specimen measured 52 mm in total length.

NEW DESCRIPTIONS

Family PILLAIIDAE, nov.
(Type: *Pillaiia Yazdani*)

ber of vertebrae (62) and absence of pyloric caeca.

Small (37-77 mm) eel-like fish without spines before dorsal and anal fins, which are united with caudal having 8-10 unbranched rays; without scales; lateral line only discernible on head; branchiostegals 6, with a very indistinct fleshy rostral process bearing anterior tubular nostrils. Gill-openings wide, mainly lateral; small pectorals; ventrals absent. Mouth wide, non-protractile, with upper jaw consisting of a single, large, strong bone bearing teeth; a free maxilla absent. Preopercular with one spine; pectoral girdle degenerate: no post-temporal, supracleithrum attached to the vertebral column; cleithrum present; no pectoral radials. Two large hypurals united at their bases and fused with last centrum. Nasals separated in the middle by a rather spindle-shaped ethmoid. Vomer toothless. Lateral ethmoid small; frontals large; parietals separated by supraoccipital. Vertebrae 62, 26 precaudal and 36 caudal. Stomach and intestine with U-shaped bends; pyloric caeca absent.

Distinguished from Chaudhuriidae by the shape of head and body, confluence of median fins, caudal having more than 7 unbranched rays, branchiostegals 6, presence of trace of fleshy rostral process and of separate supracleithrum and cleithrum, nasals widely separated in the middle by ethmoid, presence of U-shaped bends in the stomach and intestine, and smaller number (62) of vertebrae; from Mastacembelidae by the shape of head and body, absence of spines (before dorsal and anal) and scales, caudal having only unbranched rays, two large hypurals fused with last centrum, nasals widely separated in the middle by the ethmoid, absence of pectoral radials, upper jaw consisting of a single bone bearing teeth, absence of a free maxilla, smaller num-

DISCUSSION

Pillaiidae shows affinities with both Chaudhuriidae and Mastacembelidae. However, the absence of free maxilla which has so far not been recorded in any perciform fish and evolution of a single stout bone in the upper jaw in Pillaiidae are such characters which cannot be easily ignored while considering its relationship with these families. Unfortunately, we know very little about the upper jaw in Chaudhuriidae. However, the drawing of the upper jaw of *Chaudhuria caudata* (see Annandale 1918) shows striking resemblance with the upper jaw bone of *Pillaiia indica*. Although Annandale (op. cit.) does not mention about the presence or absence of maxilla in *C. caudata* yet his identification of the tooth bearing upperjaw bone as maxillary clearly suggests that it is the premaxilla rather than maxilla. If this presumption is correct Pillaiidae comes closer to Chaudhuriidae rather than Mastacembelidae (*vide* Table).

Berg (1940) remarked that *Chaudhuria* (Chaudhuriidae) is so specialized that it plainly deserves the rank of a special order. While proposing the order Chaudhuriiformes, Berg (op. cit.) appears to have been influenced by the discontinuity of various characters between Mastacembelidae and Chaudhuriidae. However, the discovery of Pillaiidae has filled up this gap and a possible evolution of chaudhuriid type form from mastacembelid stock can be easily visualized. Therefore, it is quite reasonable to group all the three families under a common order or suborder rather than ranking each one as suborder or order. Greenwood *et al.* (1966) appreciated the importance of common characters between Mastacembel-

idae and Chaudhuriidae and rightly placed them under the same suborder (Mastacembeloidi) well before the discovery of Pillaiidae which forms a link between them. The gradual modification of various characters in these families has led to extreme specialization as is evidenced in Chaudhuriidae. Pillaiidae appears to be less specialized than Chaudhuriidae and it seems probable that the latter evolved from a stock resembling Mastacembelidae through stages comparable to Pillaiidae.

Mastacembelidae contains two genera, namely, *Mastacembelus* and *Macrognathus*, the latter being restricted to oriental region only (see Sufi 1956). Both Chaudhuriidae and Pillaiidae, with single genus each, are also restricted to Burma and India in the Oriental region. The exclusive occurrence of Chaudhuri-

idae and Pillaiidae within a restricted area of about 350 miles (560 km) and availability of both the mastacembelid genera in that region suggests that Mastacembelidae perhaps evolved somewhere in the South-Chinese region and subsequently migrated westwards. This is also supported by the distribution of freshwater fishes of India which clearly indicates their South-Chinese origin and their subsequent spread westwards along the Himalayas (see Menon 1973).

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